

WHAT IS CLAIMED IS:

1. A method of forming a gate oxide layer on a semiconductor substrate comprising:
forming an oxide layer on the substrate by oxidizing the substrate in a CVD furnace;
5 introducing nitric oxide (NO) gas into the CVD furnace; and
nitriding the oxide layer in the presence of the nitric oxide gas.
2. The method of claim 1, wherein the oxide forming and nitriding steps are performed at approximately the same temperature.
3. The method of claim 1, wherein the oxide forming step is performed at a pressure of about 1.5 atm. or less.
4. The method of claim 1, wherein the nitriding step is performed at a pressure of about 1.5 atm. or less.
5. The method of claim 4, wherein the nitriding step is performed at a pressure of about 1.0 atm. or less.
6. The method of claim 2, wherein the oxide forming and nitriding steps are performed at a temperature of about 800 °C or less.
7. The method of claim 1, further comprising a step of reoxidizing the semiconductor substrate in a second oxidation step after the nitriding step.
8. The method of claim 1, further comprising a step of depositing a gate electrode layer on top of the nitrided oxide layer.
9. The method of claim 8, wherein the gate electrode layer comprises a polysilicon layer or a polycrystalline silicon/germanium layer.

10. The method of claim 9, wherein the gate electrode layer further comprises a tungsten layer or a tungsten silicide layer.

11. The method of claim 8, further comprising a step of doping the gate electrode layer with dopant.

12. The method of claim 11, wherein the dopant is boron.

13. The method of claim 1, wherein the substrate comprises Si and wherein the step of forming the oxide layer comprises forming an SiO_2 layer.

14. The method of claim 1, wherein the step of forming the oxide layer comprises reacting the substrate with an oxygen containing gas.

15. The method of claim 1, wherein the step of forming the oxide layer comprises forming an oxide layer having a thickness of about 15 Å or less.

16. The method of claim 1, wherein at least 1.5 at.% of N is incorporated into the oxide layer during the nitriding step.

17. The method of claim 1, wherein the oxide layer is a dry oxide layer.

18. The method of claim 7, further comprising a step of depositing a gate electrode layer on top of the oxidized nitrided gate oxide layer.

19. A method of nitriding a gate oxide layer on a semiconductor substrate comprising:

5 nitriding the gate oxide layer in the presence of nitric oxide (NO) gas; wherein the nitriding step is conducted at a temperature of about 800 °C or less and at a pressure of about 1 atm or less.

20. The method of claim 19, further comprising a step of oxidizing the nitrided gate oxide layer on the substrate.

21. The method of claim 20, further comprising a step of depositing a gate electrode layer on top of the oxidized nitrided gate oxide layer on the substrate.

5 22. The method of claim 19, further comprising a step of depositing a gate electrode layer on top of the nitrided gate oxide layer on the substrate.

23. The method of claim 22, further comprising a step of doping the gate electrode layer with a dopant.